

SR520 AKART Initial Screening Matrix

Indicates team deems this treatment category infeasible (fatally flawed) for the bridge

Indicates team deems this question a basis for infeasibility

Indicates additional information for feasibility determination

Screening Questions										
Phase 1 Questions						Phase 2 Questions				
ID	Treatment Category	A	B	C	D	E	F	G	H	I
		Does it Remove Highway Pollutants of Concern (TSS, oil/grease, metals)? (Y/N)	Is it Commercially Available and does it have long term availability? (Y/N)	Is the Installation or its Parts Proprietary? (Y/N)	Does it Function On The Bridge - i.e. During Bridge Movement, Vibration and Wave Action?- (Y/N)	Are there other Potential Ecosystems Impacts? (Y/N)	Is the Performance Data Available? No data available for SW treatment on floating bridges (Y/N)	How Safe Is It To Maintain On The Bridge? (Low, Medium High)	How Accessible and Reasonable Is it to Maintain? (Low, Medium, High)	Is it Dependent on Automated Mechanical and Electrical Systems? (Y/N)
1	Gravity Separation	Yes	Yes	N/A	No (baffles are not effective) (provide documentation)	Yes; need to build a pond on land	Yes, for land applications	High for traveling public, but maintenance and bridge safety depends on location, intent is to place them on the pontoon deck	Low; a confined space, and requires a specially constructed boat	No
2	Swirl Concentration	No. WSDOT testing shows poor pollutant removal performance.	Yes	Yes, but replacement would be minimal	No, because the hydraulics (swirl action) depends on stationary geometry to trap sediments					
3	Media Filtration - Vaults	Yes	Some Yes, but is based upon the media type	Some yes	Some yes, some media may be unstable, move during treatment and be subject to clogging	No; may have impacts only if land-based	Yes	No, needs a special boat	Low; access is difficult and frequency is high; Requires large transfer of media from barge to bridge	No
4	Biofiltration	Yes, but because of hydraulic loading rate is prohibitively low, it will require too much space than the bridge structure allows	Yes	Yes for installation, but No for replacement and maintenance	No, plant viability on shaded, concrete structure is questionable	No	Yes		Low; would require removal of contaminated plants and maintenance of plants during dry season	No
5	Catch Basin Media Filtration- Pillows/Cartridges	Yes, but low (may remove small particles depending on filter media)	Yes	Yes	Yes	No	Yes	Low; requires access from the roadway	Low; Only accessible from the roadway shoulder	No
6	Catch Basin Filtration- Screen/Filter Bags	Yes, but low (does not remove small particles)	Yes	Yes (can provide a treatment method similar to the commercially available technologies)	Yes (because it focuses on large grit material)	No	Yes	Low; requires access from the roadway	Low; Is accessible from the roadway shoulder	No
7	Chemical Coagulation	Yes, but requires a post-treatment and disposal method	Yes	No	Yes will coagulate during movement, but depends upon gravity separation for settlement					
8	Electrical Coagulation	No- incomplete removal of O/G, requires a post-treatment and disposal method	Yes	No	Yes; will coagulate during movement, but requires gravity separation settlement (post treatment)					
9	High Efficiency Sweeping	Yes, but requires a method to pick up larger material first; dependent on frequency	Yes	No	Yes	No	Yes, removes pollutants at the source	High (likely the safest option)	High	N/A
10	Modified Catch Basins/ Cleaning	Yes for large particles and floatables; depends on maintenance	No	No	Yes; for large particles only	No	Yes	Medium, less time spent on roadway, but still requires access from the roadway	Medium; Is accessible from the roadway shoulder	No

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Screening Questions											
		Phase 1 Questions					Phase 2 Questions				
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11	Pump/Conveyance System	Yes (in conjunction with standard land-based BMPs)	Yes, but need to be modified for floating bridges	No	Yes, but reliability questionable		Yes, requires land-based treatment ponds or vaults possibly in wetlands	Yes; WSDOT has experience with pumping systems on floating bridges	High	Low; Pump reliability is historically poor	Yes (more so than any other option). Reliability on floating bridges is historically poor because of marine environment
12	Separate Floating Structures	Yes, but similar limitations as bridge pontoons	No (all components would have to be designed and constructed)	No	No, infeasible to convey runoff from bridge to floating structure; requires pumping						
13	Covered Roadway	No, leaves them on the bridge deck	No	No	Yes		Yes; Ventilation systems may require land-based application	No	Low, Illumination maintenance/ replacement requires closed roadways	Low	Yes, lights and ventilation systems, fire control, phone system
14	Wheelwash Stations	No, may reduce TSS but not others	Yes	No	N/A		Yes; requires land-based application that raises questions of handling pollutants	Yes, but limited to construction sites	Medium	High	Yes
15	Mechanical Filtration	Yes, some but poor O/G removal, requires pre- or post-treatment	Yes	No	Yes		N/A	Yes	Low, requires use of a boat	Low; Requires constant maintenance because of system complexity	Yes, requires multiple booster pumps with filters

Elements screening questions must consider:
Safety
Maintenance
Engineering
Environmental
Cost

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Screening Questions									
Phase 2 Questions (cont.)									
ID	Treatment Category	J	K	L	M	N	O	P	Comments
		Is it Reliable long-term? - Can it hold up to the Bridge Environment? (Y/N)	Degree of Risk of Flooding Roadway? (Low, Medium, High)	Degree of Risk of Flooding Pontoons? (Low, Medium, High)	Is it Structurally Feasible? -Compatible With the Bridge Design? (Y/N)	Are There Special Cost Considerations? (Y/N)	Are There Other Potential Adverse Impacts -Noise, Aesthetics? (Y/N)	Are There Compatibility Issues With Spill Control Systems?	
1	Gravity Separation	Yes	Low	Could be moderate risk	No, if large tanks of water are used, they create dynamic response	Yes, larger structural components needed for additional pontoon buoyancy	No, but must consider aesthetics in design	No	
2	Swirl Concentration								
3	Media Filtration - Vaults	Yes, if media are changed frequently	Low	No, low risk	Yes	Yes, high initial capital investment (including pre-treatment) and maintenance costs	No, are considerations during design	Yes- after large spills, these technologies would plug and by-pass)	Are no other current applications of this technology by WSDOT; Pretreatment required
4	Biofiltration	No, plants are in the shade, dormant during the wet season, may be damaged during storm events	Low		There are documented cases of plants damaging integrity of concrete structures	Yes, will require significant costs with building additional structures to hold these devices			Does not include bio-swales
5	Catch Basin Media Filtration- Pillows/Cartridges	Yes, only if maintained properly	Medium-High; can clog rapidly and frequently under right conditions	No	Yes	Requires frequent maintenance with a high capital cost (media and equipment)	No	Yes; is a function of the size of the catch basin	
6	Catch Basin Filtration- Screen/Filter Bags	Yes, only if maintained properly	Medium-High; can clog rapidly and frequently under right conditions	No	Yes	Requires frequent maintenance with a high capital cost (media and equipment)	No	Yes; is a function of the size of the catch basin	
7	Chemical Coagulation								
8	Electrical Coagulation								
9	High Efficiency Sweeping	Yes	Low	No	Yes	Yes, commercially available sweeper units	No	No	
10	Modified Catch Basins/ Cleaning	Yes, only if maintained properly	Low	No	Yes	Requires frequent maintenance	No	Yes, is a function of the size of the catch basin and only if equipped with oil separators	

Indicates additional information for feasibility determination

Screening Questions									
Phase 2 Questions (cont.)									
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11	Pump/Conveyance System	No; Pumping and piping systems have historically proven to be unreliable, even with high levels of maintenance	Low	No	Yes	Requires generator back-up, requires 150+ pumps and must be constructed with holding tanks or vaults	Must consider aesthetics with pipes hanging from brige deck		
12	Separate Floating Structures								
13	Covered Roadway	Unknown	Low	No	Yes	Yes (Significantly) - Extra buoyancy, jet-fan ventilation system, security systems required	Yes; view issues, lighting issues		
14	Wheelwash Stations	N/A	High	No	N/A	Construction of adequate flow-through and continuous maintenance issues	Runoff from the washing stations, higher traffic congestion	N/A	Defeats the purpose of the project
15	Mechanical Filtration	Unknown; has limited or no applications to stormwater treatment	Low	No	Size of the facility may exceed the capacity of the pontoons	Yes, requires pre- or post treatment and special filters	Aesthetic considerations for large facility	Not compatible with spill control. Requires separate system for spill control.	

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TABLE 1
Indentification of Unscreened Water Quality Treatment Technologies (DRAFT)

Option Type	Technology	Manufacturer(s) / Vendor(s)	Information Sources	Information Quality	Category of Pollutants Treated																	Comments	
					Solids						Nutrients				Metals		Oxygen Demanding Substances		Organics				
					Trash/Debris	Floatable Materials	Suspended Solids	Dissolved Solids	Settleable Solids	Sediments (general)	Total Nitrogen	Total Phosphorus	Org. Phosphorous	Nutrients (General)	Heavy (Particulate)	Dissolved	General	COD/BOD	Oil & Grease	Fuels	Solvents		Other Organics
Gravity Separation																							
	Stormvault	Jensen Precast	Vendor; ASCE	VG		X	X		X	X	X	X		X	X				X				Large precast vault
	BaySaver	BaySaver, Inc.	Vendor; EPA	VG	X	X	X		X	X									X				Two manhole chambers
	Inlet/Submerged StormCeptor	Rinker Materials (formerly CSR)	Vendor; EPA	VG		X	X		X	X									X				Economically replaces inlet catch basin in small basins (48-inch diameter), using dual chamber for normal flow treatment and high flow bypass
	StormGate Separator	Stormwater Management, Inc.	Vendor	G	X	X	X		X	X									X				Used in conjunction with StormFilter
Swirl Concentration																							
	Stormtreat System V2B1	Environment 21, LLC	Vendor; EPA	VG	X	X	X		X	X					X				X				Two manhole chambers
	Downstream Defender	Hydro International (H.I.L.)	Vendor; EPA	VG	X	X	X		X	X					X				X				
	Continuous Deflective Separation	CDS Technologies	Vendor; EPA	VG	X	X	X		X	X		X			X				X				Special curb casting, large screen
	Vortechs Stormwater Treatment System	Vortechnics Inc.	Vendor; EPA	VG	X	X	X		X	X					X				X				
	Aqua-Swirl Concentrator	AquaShield Inc.	Vendor; EPA	VG	X	X	X		X	X					X				X				
	In-line/Series StormCeptor	Rinker Materials (formerly CSR)	Vendor; EPA	VG	X	X	X		X	X					X				X				
Media Filtration - Vault																							
	Aquafilter	AquaShield Inc.	Vendor	G	X	X	X		X	X	X	X		X	X			X	X				Vault requires proprietary filter bag replacement
	Stormwater Management StormFilter	Stormwater Management, Inc.	Vendor; UW	VG	X	X	X		X	X	X	X	X	X	X	X			X	X		X	Vault requires proprietary filter cartridge replacement
	Peat Beds	Aero Terra Aqua Inc., Peat Technologies	Vendor; Shipyard AKART and permit	G											X	X							Requires pretreatment of TSS and O/G and peat replacement
	Sand Beds	N/A	Ecology	VG							X				X	X							Requires pretreatment of TSS and O/G
	Zeolyte Ion Exchange	Stormwater Management, Inc.	CalTrans; Vendor	VG							X					X							Requires proprietary filter media replacement
BioFiltration																							
	Stormtreat	Stormtreat Systems	Vendor; EPA	VG		X	X		X	X	X	X	X	X	X	X		X	X				Multiple large diameter tanks holding six sedimentation chambers and constructed wetland;low flowrate
Media Filtration - Catch basins																							
	Catchbasin StormFilter	Stormwater Management, Inc.	Vendor; UW	VG	X	X	X		X	X	X	X	X	X	X	X			X	X		X	Requires proprietary filter cartridge replacement
	Ultra Urban Filter	AbTech Industries	Vendor; EPA	VG	X	X	X			X					X				X	X			Requires replacement of proprietary filter box
	Hydro-Kleen	Hydro Compliance	Vendor	G	X	X	X			X					X				X				Requires proprietary filter bag replacement
	Aqua Guard	AquaShield Inc.	Vendor; EPA	VG	X	X	X		X	X	X	X		X	X			X	X				Requires proprietary filter bag replacement
	Enviro-Drain	Enviro-Drain, Inc.	Vendor	G	X	X	X			X									X	X			Requires replacement of loose media in trays
	FlowGuard	KriStar	Vendor; UCLA	G	X	X	X			X									X	X			
	Inceptor	Stormdrain Solutions, RDI	Vendor; EPA	VG	X	X	X			X					X				X				Requires proprietary filter bag replacement
	SIFT Filter	Revel Environmental Marketing, Inc.	Vendor	G	X	X	X		X	X									X				
Catch Basin Filter with Screen/Filter Bags																							
	DrainPac Storm Drain Filter	United Stormwater, Inc.	Vendor	G	X	X	X			X									X				Geotextile bag
	Curb/Grate Inlet Basket	Bio Clean	Vendor	G	X	X	X			X									X				
	StormScreen	Stormwater Management, Inc.	Vendor	G	X	X				X													Pretreatment device

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					Trash/Debris	Floatable Materials	Suspended Solids	Dissolved Solids	Setteable Solids	Sediments (general)	Total Nitrogen	Total Phosphorus	Org. Phosphorous	Nutrients (General)	Heavy (Particulate)	Dissolved	General	COD/BOD	Oil & Grease	Fuels	Solvents	Other Organics	
Chemical Coagulation																							
	PAM	Agro-Tech, Chemco	WSDOT	VG			X		X	X				X									Used as soil stabilization only; not approved for direct discharge; requires downstream treatment; experimental
Electrical Coagulation																							
	Electrical coagulation	Water Techtonics Inc.	Vendor	VG			X		X	X													Requires power source and downstream treatment
High Efficiency Sweeping																							
	High Efficiency Sweeping	Tennant, Elgin, Schwarze	FHA; Vendor;CHI	G	X	X	X		X	X		X			X				X				Regenerative air and vacuum
Modified Catch Basins / Cleaning																							
	Catch Basin Cleaning	N/A	Los Angeles Stormwater Management Division: EPA	G	X	X	X		X	X					X				X				
	The Snout	Best Management Products, Inc	Vendor; EPA	VG	X	X	X			X									X				
Pump / conveyance System																							
	Pump/conveyance System	Various	Vendor	G	X	X	X		X	X					X				X				Requires power source
Separate Floating Structures																							
	Separate Floating Structures	N/A	WSDOT	P																			Requires off-bridge conveyance system and anchoring system
Covered Roadway																							
	Covered Roadway	N/A	WSDOT	P																			Major additional structural requirements
Wheelwash Stations																							
	Wheel Wash Stations	Interclean, VEWI	Unknown	P																			Never used on roadways, requires power source and slow speeds
Mechanical Filtration																							
	Synthetic Ion Exchange	US Filter	Vendor	G											X								Requires power source, pretreatment of TSS and O/G
	Micro Filtration	US Filter; Koch Membrane	Vendor	P			X		X	X									X				Requires power source and pressurized flow (booster pump)
	Reverse Osmosis	US Filter	Vendor	G				X			X	X	X	X		X	X	X					Requires power source, pressurized flow (booster pump) and downstream treatment/disposal

P = Poor (no cost or effectiveness data)
F = Fair (limited cost and effectiveness data)
G = Good (cost and effectiveness data from one source)
VG = Very Good (cost and effectiveness data from multiple sources)